

PATENT

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TITLE OF THE INVENTION
EXCLUDING UNWANTED PAGES IN A PRINTING SYSTEM JOB

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates generally to the art of job processing in a printing system. The present invention finds application where the input in a printing, copying or faxing job includes images or pages that are unwanted in the output of the job. For example, the present invention finds application where the input to a job contains blank pages, or separator pages containing, for example, a logo, wherein the blank or logo bearing pages are not desired in the output of the job.

2. DESCRIPTION OF RELATED ART

When handling and processing paper documents, such as, for example, reports and memos in an office environment, it is often too time consuming to concern oneself with paper conservation. For example, sometimes documents contain blank pages. For instance, a first portion of a document is printed from a file containing an extra form feed command and the pages are quickly gathered from an output tray of a printer and collated with a second portion of the document. The collated document is then copied many times. Each copy including the blank page. Alternatively, blank pages are intentionally inserted in a document as a means

to separate sections of the document. Subsequent copies or faxings of the document do not require the separator pages. Nevertheless the separator pages are inadvertently duplicated. When copying or faxing a document that
5 contains a blank page, the cost of copying or faxing the blank page may be inconsequential when compared to the time that would have to be spent searching for and removing the blank page from a set of pages being faxed or copied. Additionally, such search and remove operations, in a
10 rushed and crowded office environment, are preformed at the risk of dropping and damaging and/or un-collating the document. Therefore, people involved in paper document reproduction often opt for the faster and safer practice of copying and faxing complete packets of papers, whether or
15 not the packets include wasteful blank pages. Nevertheless, the practice is wasteful in many ways, including material, time, energy, and equipment wear. While the waste maybe minimal in any one instance, the aggregate waste, across time, and around the world, is
20 significant.

Readily available printing systems, such as, for example, facsimile machines, personal computers, printers, copiers, and more sophisticated document processors, do not provide any assistance in eliminating this waste. As the
25 impact our activities have on our environment becomes more apparent, there is a desire to minimizing that impact, if not where ever possible, at least where ever practical.

Therefore, it is desirable to provide, in a printing system, an inexpensive, fast, and automatic method for
30 finding blank and undesired images or pages in an input document and excluding the undesired elements from a document output.

BRIEF SUMMARY OF THE INVENTION

To those ends, a method operative to automatically exclude a wasteful or unwanted portion of a job from an output stream of a printing system has been developed. The method comprises the steps of describing characteristics of the unwanted portion of the job, and searching within input image data for portions of the job that have the described characteristics.

If a portion of the job that appears to be wasteful or unwanted is located, the portion is removed automatically. Alternatively, an operator may intervene to prevent the removal.

An exemplary embodiment is a method operative to automatically exclude a blank page in an input stream of a printing system job from an output stream of the printing system job. The method comprises the steps of detecting data representative of a blank page in the input stream, and deleting the data representative of the blank page from the input stream, thereby excluding the blank page from the output stream.

A printing system operative to automatically remove unwanted portions of input image data comprises a pattern detector and a portion deleter. The pattern detector is operative to receive a description of an unwanted portion of the input image data, search for a portion of the input image data that corresponds to the description of the unwanted portion, and, if the search is successful, relate information about a found portion. The portion deleter is operative to receive information from the pattern detector, regarding a location of the found portion of the input

image data, and remove the found portion of the input image data, to generate output image data.

One advantage of the present invention resides in the environmentally friendly ability to automatically prevent the duplication of unwanted portions of a printing system job, such as, for example, blank pages or separator pages.

Another advantage of the present invention is found in reduced printing system consumables costs.

Yet another advantage of the present invention is a reduction in printing system wear.

Another advantage of the present invention stems from a reduction in reproduction time. Time not spent reproducing or transmitting unwanted portions of a printing system job, results in a cost savings.

Still other advantages of the present invention will become apparent to those skilled in the art upon a reading and understanding of the detail description below.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The invention may take form in various components and arrangements of components, and in various steps and arrangements of steps. The drawings are only for purposes of illustrating preferred embodiments, they are not to scale, and are not to be construed as limiting the invention.

FIGURE 1 is a flow diagram outlining steps in a method that is operative to exclude unwanted or wasteful portions of a printing system job;

FIGURE 2 is a block diagram of a printing system operative to perform the method of FIGURE 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGURE 1, a method 110 operative to exclude unwanted or wasteful pages of a printing system job includes a target description step 120. Of course, the method 110 is also useful for removing unwanted portions of a page. In the target description step, a printing system, such as, for example, a personal computer, fax machine, document copier, or electronic publishing system, is given a description of an unwanted page. The description is for example, made a default or selected description. For example, the printing system is given a default description of a blank sheet or page. For example, a blank sheet or page is defined as any sheet having no marks or any sheet having less than a threshold amount of marking. For instance, any sheet or page that is described by input data to include marks on less than 0.5% of the area of the page is classified a blank page. Alternatively, an unwanted sheet or page is described by some other means. For example, a sample unwanted page, sheet or portion, is scanned into the printing system or delivered from a mass storage device or computer network. For example, a non-blank separator page is scanned into the printing system. For instance, a separator page may include a company logo, or an informational phrase such as "INTENTIONALLY LEFT BLANK" or "SECRET". Alternatively, separator page text is entered through a keyboard or electronic file. For example, an unwanted separator page is described by typing the phrase "INTENTIONALLY LEFT BLANK" on an operator interface, such as, for example, a keyboard.

Once the printing system has been initialized with an unwanted page or portion description, the job is entered into the system. For example, an electronic file or data

stream is input into the printing system. Alternatively, a stack of document papers is loaded into an input tray of a scanner associated with the printing system. For example, papers are loaded into the input tray of a scanner of a fax machine or copier and scanning is initiated.

Once input scanning or file reading begins, an input imaged data stream is available to the printing system and image data can be tested in an input image data-testing step 124. Any appropriate image-testing scheme may be employed. For example, cross correlation techniques are employed to find input image data corresponding to scanned separator pages. Alternatively, optical character recognition techniques are used to find pages containing specified phrases. Preferably, the search technique is fast. For example, a statistical sampling is taken across an area of the described page. The sample is compared to a threshold value. For example, a sampled marked pixel percentage is compared to a threshold percentage of, for example, 0.5%. If the sampled marked pixel percentage of a page description is below the threshold, then the page description is classified a blank page. Alternatively, a total number of marked pixels called for in a page description are counted. The total is compared to a threshold value. If the total number of marked pixels in a page description is below the threshold, the page is classified as a blank page. Of course, unmarked pixels can be counted instead of marked pixels. In that case a total above a threshold would indicate a blank page.

Optionally, if a portion of the job is located that matches the description of the unwanted page, processing proceeds according to a job type classification. The job classification is determined in a job type determination

step 128. Typically, job classification information is entered before a job is scanned and the information is read from a system memory. However, the printing system may query a system user for classification information at any appropriate time. Default processing procedures are followed based on the job type classification. For example, unwanted pages are automatically removed in an unwanted portion removal step 132 in copy/fax type jobs 138. In print type jobs 142, it is assumed that separator or blank pages are included in the input on purpose, therefore a default procedure for print type jobs 142 is to produce separator and blank pages. Of course, the job type determination step may be performed earlier, and where appropriate, the entire method 110 may be by passed if the job type does not warrant the use of the method 110. Alternatively, a job type classification is used to instruct a printing system to ask an operator for instructions on a job-by-job basis 146. In that case, when a portion of a job matches the description of an unwanted portion, the operator is notified in an operator notification step 148. Additionally, a request is made of the operator for permission or authorization to delete the located portion. If authority is granted the unwanted portion removal step 132 is performed. If portion removal is prohibited, then the portion is produced in an output production step 150. Of course, all portions of the job that do not correspond to the description of an unwanted portion are also produced in the output production step 150.

In an end of job testing step 154 a determination is made regarding whether or not the entire input stream has been searched. For example, if an end of file marker has

not been reached, searching (step 124) resumes in unexamined portions of the input data. Eventually all wanted portions of the input data (including wanted portions that match the description of unwanted portions) are produced in the output production step 150. For example, all wanted portions of the job are faxed, copied, or electronically printed. Where appropriate, the unwanted portion removal step 132 not only deletes the unwanted portions from the printing system input stream, but also deletes the unwanted portions from an original input file. For example, a network file or file on a disk drive is updated with the unwanted portions of the file removed or deleted.

Referring to FIGURE 2, a printing system 210 operative to perform the method 110 for excluding unwanted or wasteful pages of a printing system job includes a pattern detector 220. The pattern detector 220 has access to input image data. For example, the pattern detector 220 is in communication with an image data bus 224. The pattern detector 220 examines input data, for example, as the input data is delivered from an image source 228. The image source 228 is for example a document scanner, or an electronic file delivered from, for example, a computer network or mass storage device, such as, a disk drive. Alternatively, the pattern detector 220 examines image data that is in storage. For example, the pattern detector examines image data stored on a disk drive or in an electronic memory, such as for example an electronic pre-collation (EPC) memory 232.

The pattern detector 220 accepts an unwanted page description from an unwanted page description source. For example, a default blank page description is received from

about the unwanted page to the portion deleter 250. The portion deleter 250 then proceeds as described above and deletes the unwanted page. However, if the job is not a copy job or a "job-by-job" type job, but is instead, for example, a print job, then the portion is not deleted. Indeed, if the job is a print job then, in some implementations, the entire method 110 is bypassed.

Of course, all undeleted page of the input image data (including pages of the input image data that do not match the unwanted page description, and pages of the input image data that do match the unwanted page description, but are not deleted due to operator input) are allowed to proceed, through normal printing system processes, to an image destination 254. For example, the image destination 254 is a print engine or marking platform. For example, the image destination is a xerographic printer, inkjet printer, thermal printer or other hard copy producing device. Alternatively, the image destination 254 is a modem such as, for example, a fax modem, for transmitting an output data stream over telephone lines or a network interface for transmitting information over a computer network. Of course, other image destinations are also contemplated. For example, the output data stream may be delivered to a mass storage device such as a disk drive.

Typically the pattern detector 220 and the portion deleter 250 are implemented as software modules run by a computational platform (not shown) such as a microprocessor or digital signal processor. For example, the pattern detector 220 and the portion deleter 250 are included in a xerographic environment. Of course, the functions of the modules 220, 250 may be combined and implemented in a larger module. Alternatively, the functions may be distributed

over a number of smaller modules. The default settings repository 236 is preferably implemented in a non-volatile memory such as EEPROM or Flash memory. The EPC memory 232 may be volatile or non-volatile. Preferably, the EPC memory 232 is implemented in DRAM. The operator interface can be any operator interface, including for example, any of; a keyboard, liquid crystal display, touch screen, mouse, roller ball, CRT, and microphone and speaker.

The invention has been described with reference to particular embodiments. Modifications and alterations will occur to others upon reading and understanding this specification. For example, the invention may be applied in other kinds of printing systems. Searching and filtering techniques other than those mentioned may be used to find the unwanted portions of a job. Where the invention has been described in reference to deleting entire pages, the invention may instead be used to delete only portions of a page or more than a single page. For example, logos and letterhead images may be deleted. Optionally, remaining portions of the input data may be moved. For example, to better use the space that was occupied by the logo or letterhead portions of a document may be automatically brought in closer proximity. Furthermore, stroke type objects may be recognized (in the searching step 124) and removed from input data (in the deleting step 132), thereby generating clean versions of marked up images. It is intended that all such modifications and alterations are included insofar as they come within the scope of the appended claims or equivalents thereof.